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ORIGINAL ARTICLE

Three new species of Phyllocoptini (Prostigmata: Eriophyidae: Phyllocoptinae) from South China

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Abstract Three new species of the tribe Phyllocoptini from China are described and illustrated in this paper, namely *Caliphytoptus illigerae* **sp. nov.**, *Leipothrix schima* **sp. nov.**, and *Paracaliphytoptus alnus* **sp. nov.** The genus *Caliphytoptus* is firstly recorded from China.

Key words Prostigmata, Eriophyoidae, Phyllocoptini, Phyllocoptinae, new species, China.

1 Introduction

The tribe Phyllocoptini was characterized by empodium entire, dorsal annuli evenly downcurved, scapular setae placed ahead of rear shield margin, and distinguished easily from the other tribes of subfamily Phyllocoptinae (Amrine *et al*., 2003). Up to 2003, 53 genera and 555 species have been reported worldwide. Hong *et al.* (2010) reported 35 genera and 189 species from China. In this paper, three species, namely, *Caliphytoptus illigerae* **sp. nov.**, *Leipothrix schima* **sp. nov.** and *Paracaliphytoptus alnus* **sp. nov.**, are identified and described as new to science. Besides that, the genus *Caliphytoptus* is firstly recorded from China here.

2 Materials and methods

Specimens were located using a magnifying glass on plant material in the field, collected, and preserved in sucrose-ethanol solution (75%). The mites were cleared in Nesbitt's solution and mounted in Heinze medium on glass slides at room temperature according to Kuang (1986). Specimens were measured following the procedures of de Lillo *et al.* (2010). Morphological terminology and generic classification follow Amrine *et al*. (2003).

Type specimens are deposited in the Department of Plant Protection, Guangxi University, Nanning. All measurements are in micrometers (μm) and rounded off to the nearest full number, and denote lengths unless specified. Specimens were examined with an Olympus CX41 (Philippines) microscope with phase contrast. The number of measured specimens is given in parentheses.

3 Taxonomy

Superfamily Eriophyoidea
  Family Eriophyidae

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Subfamily Phyllocoptinae
Tribe Phyllocoptini Nalepa, 1892

3.1 Genus *Caliphytoptus* Keifer, 1938 New record to China

Caliphytoptus Keifer, 1938. *Eriophyid Studies* II, 27: 311.
Type species: *Caliphytoptus quercilobatae* Keifer, 1938.

***Caliphytoptus illigerae* sp. nov.** (Figs 1–7)

Diagnosis. Yellowish fusiform body; gnathosoma curved obliquely downward; prodorsal shield frontal lobe with ventral spur; absent median and submedian lines; complete admedian lines; coxisternal plates sculptured with lines; prosternal apodeme; coxigenital annuli 3 or 4; tarsal empodium entire; six-rayed; tarsal solenidion unknobbed; dorsal opisthosoma with median and admedian ridges; dorsal annuli smooth; ventral annuli with elongated microtubercles; absent setae *h1*; female genitalia coverflap with basal granula and distal ridges.

Description. Female (n = 5). Body fusiform, yellowish, 115 (106–123), 34 (31–39) wide, 29 (26–33) thick.

Gnathosoma. Curved obliquely downward, 17 (16–18), coxal setae (*ep*) 2 (2–3), dorsal genual setae (*d*) 6 (6–7), subapical pedipalp tarsal setae (*v*) 3; cheliceral stylets 17 (16–18).

Prodorsal shield. 41 (38–43), 30 (29–31) wide, frontal lobe with ventral spur; median and submedian lines absent, admedian lines complete, connected anteriorly traverse line; scapular tubercles placed ahead rear shield margin, 13 (13) apart, scapular setae (*sc*) 7 (5–9), directed upward.

Coxisternal plates. Prosternal apodeme present, coxisternal plates I and II sculptured with short lines; anterolateral setae on coxisternum I (*1b*) 5 (5), 7 (6–8) apart; proximal setae on coxisternum I (*1a*) 15 (15), 5 (4–5) apart; proximal setae on coxisternum II (*2a*) 32 (30–35), 14 (13–15) apart. Coxigenital annuli 6 (5–6).

Legs. Segments normal. Leg I 28 (25–32), trochanter 2 (2), femur 12 (12–13), femoral setae (*bv*) 14 (13–15); genu 4 (3–4), genual setae (*l″*) 22 (20–23); tibia 6 (5–7), tibial setae (*l′*) located median, 12 (10–15); tarsus 6 (5–6), inner fastigial tarsal setae (*ft′*) 20 (20), outer fastigial tarsal setae (*ft″*) 20 (20), unguinal tarsal setae (*u′*) 4 (3–5); tarsal empodium entire, 7 (6–8), 6-rayed, tarsal solenidion 7 (6–8), unknobbed. Leg II 24 (22–25), trochanter 2 (2), femur 10 (10), femoral setae (*bv*) 6 (5–7); genu 3 (2–3), genual setae (*l″*) 12 (11–13); tibia 4 (3–4); tarsus 5 (5–6), inner fastigial tarsal setae (*ft′*) 21 (20–22), outer fastigial tarsal setae (*ft″*) 6 (6), unguinal tarsal setae (*u′*) 3 (2–3); tarsal empodium entire, 7 (7–8), 6-rayed, tarsal solenidion 8 (8), unknobbed.

Opisthosoma. Dorsum with median and admedian ridges, dorsal annuli 62 (62), smooth; ventral annuli 79 (79), with elongated microtubercles; setae *c2* 21 (20–23), on ventral annulus 11th; setae *d* 50 (50), 22 (20–25) apart, on ventral annulus 25th; setae *e* 21 (20–23), 11 (9–13) apart, on ventral annulus 47th; setae *f* 25 (25), 11 (9–13) apart, on 8th ventral annulus from rear; setae *h1* absent, setae *h2* 62 (55–65).

Female genitalia. Coverflap with basal granules and distal longitudinal ridges, 12 (10–13), 16 (15–17) wide, proximal setae on coxisternum III (*3a*) 19 (18–20), 12 (11–14) apart.

Male. Unknown.

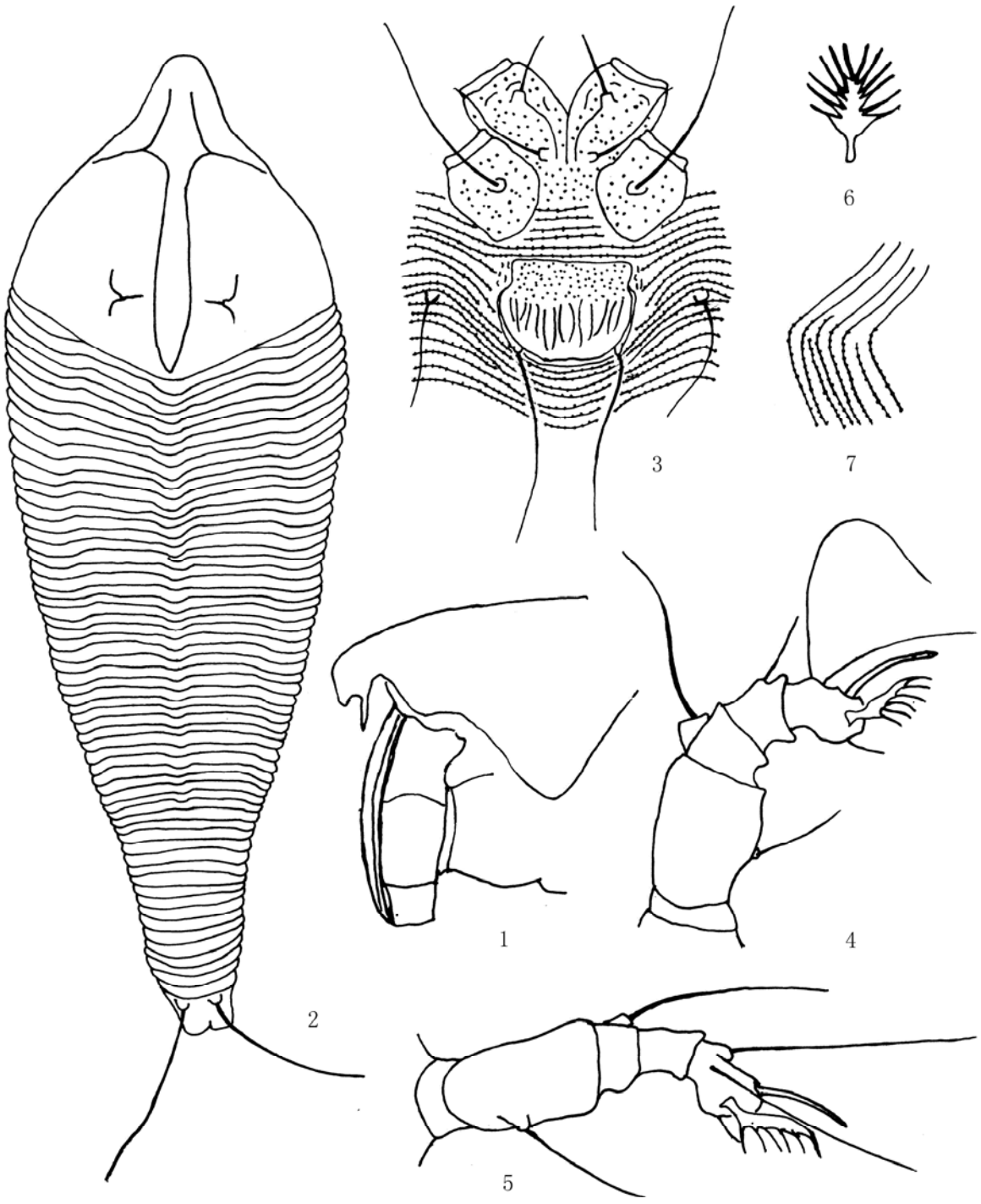
Holotype female, Huanglianshan National Nature Reserve (22°52′N, 102°17′E), Lvchun County, Yunnan Province, China, 16 May 2009, leg. Guo-Quan Wang, from *Illigera rhodantha* Hance (Illigeraceae). Paratypes 4 females, same data as holotype.

Relation to host. The mites are vagrants on the undersurfaces of leaves, with no visible damage.

Distribution. China (Yunnan).

Etymology. The specific designation is derived from the generic name of the type host plant, gender masculine.

Remarks. With the description of this new species, the genus *Caliphytoptus* Keifer, 1938 is first recorded from China. The new species is similar to *C. quercilobatae* Keifer, 1938, but can be distinguished from the latter by the coxisternal plates are sculptured with short lines, and tarsal empodium six-rayed and female coverflap are sculptured with basal granules. In *C. quercilobatae*, the coxisternal plates and female coverflap are smooth and tarsal empodium five-rayed (Keifer 1938).



Figs 1–7. *Caliphytoptus illigerae* **sp. nov.** 1. Antero-lateral view of female. 2. Dorsal view of female. 3. Coxigenital area of female. 4. Leg I. 5. Leg II. 6. Empodium. 7. Lateral view of annuli.

3.2 Genus *Leipothrix* Keifer, 1966

Leipothrix Keifer, 1966. *Eriophyid Studies* B-19: 1.
Type species: *Leipothrix solidaginis* Keifer, 1966.
Flechtmannia Keifer, 1979.

***Leipothrix schima* sp. nov.** (Figs 8–15)

Diagnosis. Yellowish or yellow fusiform body; gnathosoma curved obliquely downward; prodorsal shield frontal lobe; complete median and admedian lines; absent submedian lines; smooth coxisternal plates; prosternal apodeme; coxigenital annuli 9; tarsal empodium entire; four-rayed; tarsal solenidion knobbed; dorsal opisthosoma with median and admedian ridges; smooth dorsal annuli; ventral annuli with rounded microtubercles; absent setae *h1*; female genitalia coverflap with distal ridges.

Description. Female (n = 5). Body fusiform, yellowish or yellow, 125 (113–150), 58 (56–60) wide, 27 (25–30) thick.

Gnathosoma. Curved obliquely downward, 21 (21), coxal setae (*ep*) 2 (2–3), dorsal genual setae (*d*) bifurcated, 15 (15–16); cheliceral stylets 23 (20–25).

Prodorsal shield. 46 (44–48), 55 (53–57) wide, frontal lobe present; median and admedian lines complete, submedian lines absent; scapular tubercles placed ahead rear shield margin, 14 (13–14) apart, scapular setae (*sc*) 3 (3–4), directed upward.

Coxisternal plates. Prosternal apodeme present, coxisternal plates smooth; anterolateral setae on coxisternum I (*1b*) 13 (12–13), 17 (16–18) apart; proximal setae on coxisternum I (*1a*) 9 (8–10), 8 (8–9) apart; proximal setae on coxisternum II (*2a*) 26 (23–30), 20 (18–23) apart. Coxigenital annuli 9.

Legs. Segments normal. Leg I 33 (32–36), trochanter 2 (2), femur 11 (11–12), femoral setae (*bv*) absent; genu 4 (4–5), genual setae (*l''*) 25 (25); tibia 9 (8–9), tibial setae (*l'*) located inside from 1/5 base, 5 (5); tarsus 7 (7–8), inner fastigial tarsal setae (*ft'*) 10 (10), outer fastigial tarsal setae (*ft''*) 20 (18–23), unguinal tarsal setae (*u'*) bent, 5 (5–6); tarsal empodium entire, 7 (6–7), 4-rayed, tarsal solenidion 7 (6–7), knobbed. Leg II 31 (29–34), trochanter 2 (2), femur 11 (10–11), femoral setae (*bv*) absent; genu 4 (3–4), genual setae (*l''*) 8 (7–10); tibia 6 (6); tarsus 6 (6–7), inner fastigial tarsal setae (*ft'*) 20 (20), outer fastigial tarsal setae (*ft''*) 6 (5–8), unguinal tarsal setae (*u'*) 4 (3–4); tarsal empodium entire, 7 (7–8), 4-rayed, tarsal solenidion 8 (8–9), knobbed.

Opisthosoma. Dorsum with median and admedian ridges, dorsal annuli 33 (33), smooth; ventral annuli 62 (62), with rounded microtubercles; setae *c2* 15 (15), on ventral annulus 14th; setae *d* 30 (30), 27 (25–28) apart, on ventral annulus 27th; setae *e* 15 (15), 10 (10–11) apart, on ventral annulus 39th; setae *f* 20 (20), 18 (15–21) apart, on 6th ventral annulus from rear; setae *h1* absent, setae *h2* 51 (45–55).

Female genitalia. Coverflap with distal longitudinal ridges, 10 (10), 19 (19) wide, proximal setae on coxisternum III (*3a*) 13 (13), 11 (10–12) apart.

Male (n = 2). Same as female, body fusiform, 123, 51 wide; male genital 15 wide, proximal setae on coxisternum III (*3a*) 11, 9 apart.

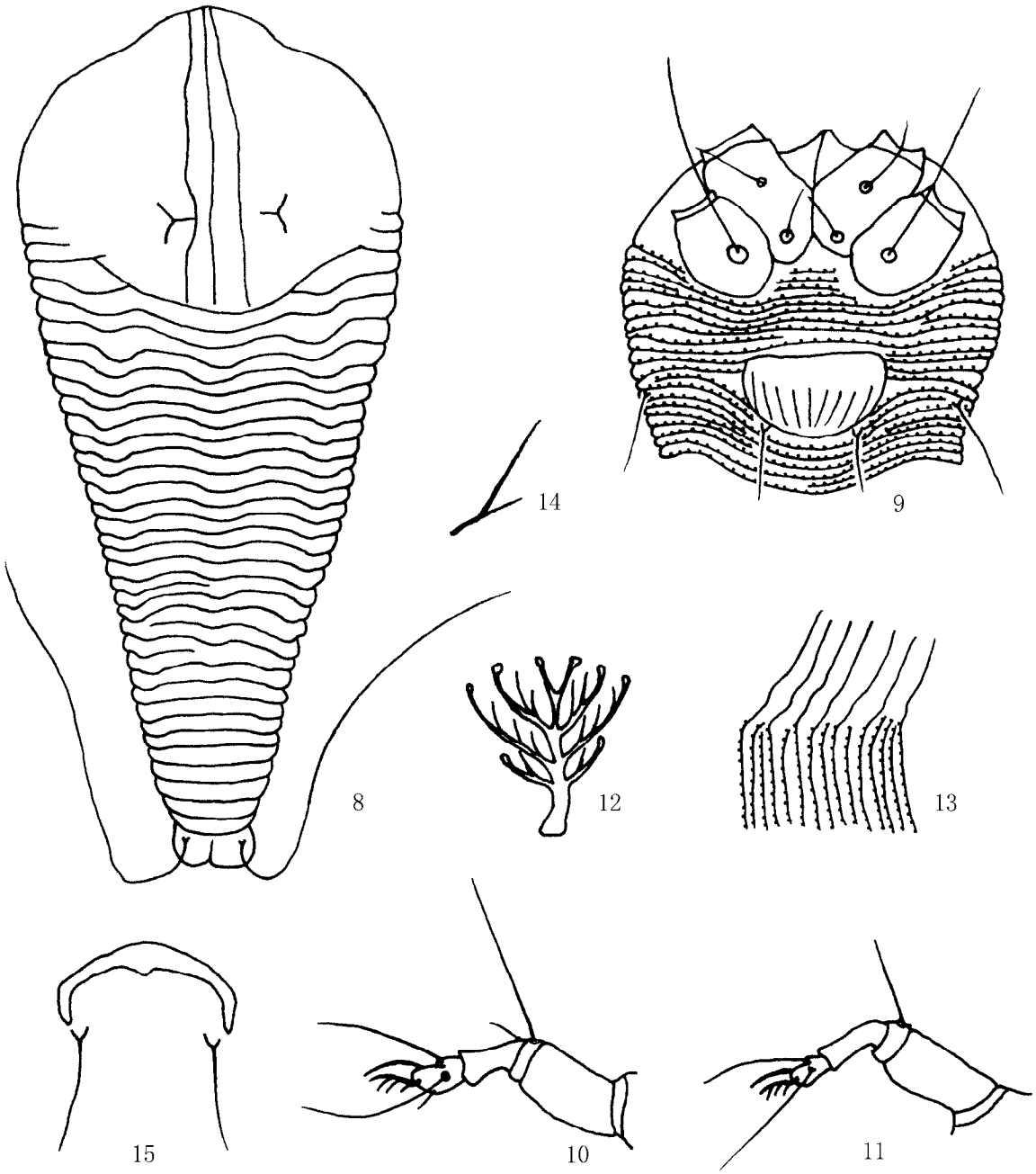
Holotype female, Fengyangshan National Nature Reserve (27°53´N, 119°11´E), Longquan City, Zhejiang, China, 28 July 2007, leg. Guo-Quan Wang, from *Schima superba* Gardn. & Champ (Theaceae). Paratypes 4 females and 2 males, same data as holotype.

Relation to host. The mites are vagrants on the undersurfaces of the leaves, with no visible damage.

Distribution. China (Zhejiang).

Etymology. The specific designation is derived from the generic name of the type host plant, gender feminine.

Remarks. The new species is similar to *L. lysimachiae* Hong & Kuang, 1989, but can be distinguished from the latter by the complete prodorsal shield median line, absent submedian lines, and absent setae *h1*. In *L. lysimachiae*, the median and submedian lines are incomplete and setae *h1* is present (Hong & Kuang, 1989).



Figs 8–15. *Leipothrix schima* **sp. nov.** 8. Dorsal view of female. 9. Coxigenital area of female. 10. Leg I. 11. Leg II. 12. Empodium. 13. Lateral view of annuli. 14. Dorsal genual setae. 15. Genital of male.

3.3 Genus *Paracaliphytoptus* Xue, Wang, Song & Hong, 2009

Paracaliphytoptus Xue, Wang, Song & Hong, 2009. *Zootaxa*, 2253: 59.
Type species: *Paracaliphytoptus yangensis* Xue, Wang, Song & Hong, 2009.

***Paracaliphytoptus alnus* sp. nov.** (Figs 16–21)

Diagnosis. Yellow fusiform body; gnathosoma curved obliquely downward; bent dorsal genual setae; prodorsal shield frontal lobe with ventral spur; incomplete median and admedian lines; complete submedian lines; smooth coxisternal plates; prosternal apodeme; coxigenital annuli 1; tarsal empodium entire; six-rayed; tarsal solenidion unknobbed; dorsal opisthosoma with five ridges; smooth dorsal annuli; ventral annuli with elongated microtubercles; absent setae *h1*; female genitalia coverflap with distal ridges.

Description. Female (n = 5). Body fusiform, yellow, 125 (119–129), 50 (50) wide, 33 (33) thick.

Gnathosoma. Curved obliquely downward, 22 (19–24), coxal setae (*ep*) 2 (2–3), dorsal genual setae (*d*) bent, 11 (11), subapical pedipalp tarsal setae (*v*) 2 (2–3); cheliceral stylets 21 (20–21).

Prodorsal shield. 43 (43–44), 46 (46) wide, frontal lobe with long, ventral spur; median and admedian lines incomplete, submedian lines complete; scapular tubercles placed ahead rear shield margin, 13 (13) apart, scapular setae (*sc*) 9 (8–10), directed upward.

Coxisternal plates. Prosternal apodeme present, coxisternal plates I and II smooth; anterolateral setae on coxisternum I (*1b*) 10 (10), 11 (11) apart; proximal setae on coxisternum I (*1a*) 15 (15), 9 (9) apart; proximal setae on coxisternum II (*2a*) 35 (35), 27 (27) apart. Coxigenital annuli 1.

Legs. Segments normal. Leg I 34 (33–35), trochanter 2 (2–3), femur 13 (13), femoral setae (*bv*) 11 (11); genu 5 (5), genual setae (*l″*) 15 (15); tibia 8 (7–8), tibial setae (*l′*) located median, 8 (7–8); tarsus 6 (6), inner fastigial tarsal setae (*ft′*) 23 (23), outer fastigial tarsal setae (*ft″*) 20 (20), unguinal tarsal setae (*u′*) 4 (4); tarsal empodium entire, 7 (7), 6-rayed, tarsal solenidion 7 (7–8), unknobbed. Leg I 31 µm. Leg II 29 (26–30), trochanter 2 (2), femur 12 (11–12), femoral setae (*bv*) 13 (13); genu 4 (3–4), genual setae (*l″*) 10 (10–13); tibia 6 (5–6); tarsus 5 (5–6), inner fastigial tarsal setae (*ft′*) 20 (20), outer fastigial tarsal setae (*ft″*) 7 (7), unguinal tarsal setae (*u′*) 5 (5); tarsal empodium entire, 7 (6–8), 6-rayed, tarsal solenidion 8 (8), unknobbed.

Opisthosoma. Dorsum with 5 ridges, dorsal annuli 45 (45), smooth; ventral annuli 66 (66), with elongated microtubercles; setae *c2* 41 (35–45), on ventral annulus 10th; setae *d* 70 (70), 26 (25–28) apart, on ventral annulus 23th; setae *e* 22 (20–23), 10 (10) apart, on ventral annulus 44th; setae *f* 25 (25), 15 (15) apart, on 5th ventral annulus from rear; setae *h1* absent, setae *h2* 60 (55–65).

Female genitalia. Coverflap with and distal longitudinal ridges, 15 (15), 23 (23) wide, proximal setae on coxisternum III (*3a*) 21 (18–25), 15 (15) apart.

Male (n = 1). Same as female, body fusiform, 138, 53 wide; prodorsal shield 45, 49 wide; male genital 19 wide, proximal setae on coxisternum III (*3a*) 13, 13 apart.

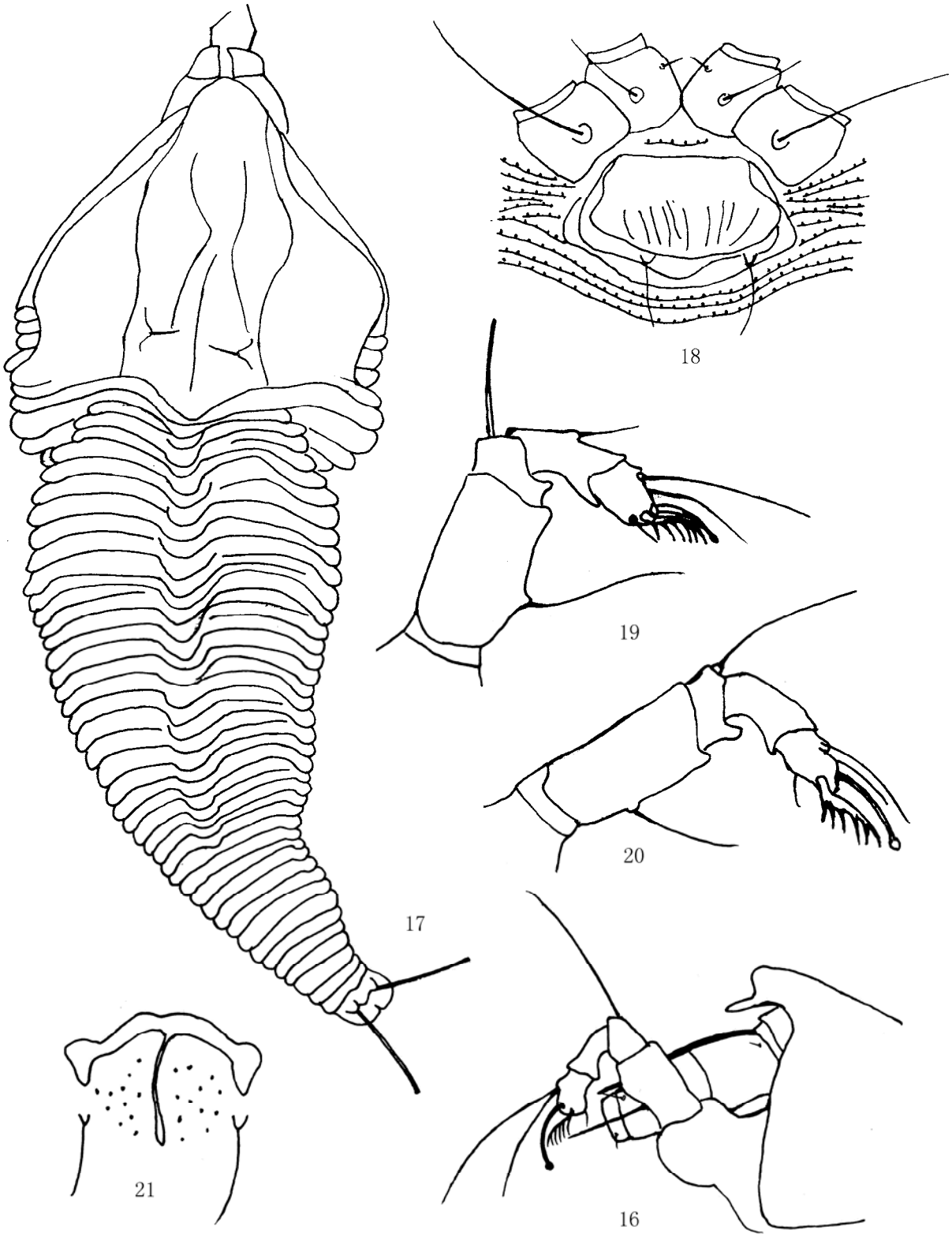
Type material. Holotype female, Huanglianshan National Nature Reserve (22°52′N, 102°17′E), Lvchun County, Yunnan Province, China, 16 May 2009, leg. Guo-Quan Wang, from *Alnus nepalensis* Don (Betulaceae). Paratypes, 6 females and 1 male, same data as holotype.

Relation to host. The mites are vagrants on the undersurfaces of the leaves, with no visible damage.

Distribution. China (Yunnan).

Etymology. The specific designation is derived from the generic name of the type host plant, gender masculine.

Remarks. The new species is similar to *P. yangensis* Xue, Wang, Song & Hong, 2009, but can be distinguished from the latter by the smooth coxisternal plates and absent setae *h1*. In *P. yangensis*, the coxisternal plates are sculptured with granules and setae *h1* is present (Xue *et al.*, 2009).



Figs 16–21. *Paracaliphytoptus alnus* **sp. nov.** 16. Antero-lateral of female. 17. Dorsal view of female. 18. Coxigenital area of female. 19. Leg I. 20. Leg II. 21. Genital of male.

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